Space Weather Forecast

Issued on Wednesday, 31 July 2024 at 01:18 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Coronal Mass Ejection arrivals expected, most likely Day 1 (31 Jul), with G1-G2 Minor to Moderate storms and a chance of G3 Strong Storms. Ongoing Moderate to High activity.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with at least four Moderate class flares observed.

There are twelve sunspot regions on the disc, with a number of these containing complex magnetic field structures. This includes a large region in the southwest and a region in the north-centre disc which persists as a more compact region. Several sunspot regions make up a cluster of spots just west of south-centre disc, with complex interactions existing between them due to their proximity. A new smaller region is also emerging west of the main central cluster.

A new region rotating over the far east limb may show significant complexity, but it is difficult to analyse due to the current viewing angle. This region is likely the anticipated source of the recent large far-sided events and has also been responsible for the strongest flare in the past 24 hours at 30/1938UTC. The region has been given a preliminary analysis, however further complexity is likely to become apparent as it moves further onto the disc.

A number of coronal mass ejections (CMEs) were observed, with one assessed with the potential for Earth-directed components. This likely giving a glancing arrival on 01 Jul.

Solar Wind / Geomagnetic Activity: The solar environment has been under waning CME influences over the last 24 hours due to a late CME arrival at L1 late on the 29th. Solar winds speeds, as measured by ACE at L1, initially increased to peak at elevated levels, then showed a slow decline to finish the period at slightly elevated levels. Interplanetary Magnetic Field, Bt, was initially strong then declined to be moderate for most of the period, before finishing at weak levels. The north-south component was initially Moderately positive (northward), but then switched to be moderately negative (southward). An erratic weakening trend was then observed before finishing at weakly positive values. The resulting Geomagnetic activity was Active to G1 Minor Storm (Kp4-5) at first, with G1 observed 30/0300-0600 UTC, before falling to Quiet to unsettled (Kp1-3) from 30/1200 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no Solar Radiation Storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to High activity is expected with further Moderate class flares expected and chance of isolated Strong-class flares.

Solar Wind /Geomagnetic Activity: A number of CMEs have the potential to arrival through the period. The CMEs from the M9.9 early on 28 Jul, and then the M2.6 and long period M1.7 later on 28 Jul are expected to combine to give a single arrival early on Day 1 (31 Jul). A further glancing CME arrival is then likely on Day 2 (01 Aug) from the M8.7 flare on 29 Jul. No coronal hole fast wind enhancements are expected, with CME arrivals expected to dominate, bringing spells of slightly elevated to elevated winds, and periods of Active to G1-G2 Minor to Moderate

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Storms. There is a chance of G3 intervals, mainly Day 1 (31 Jul).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to rise above background at times in response to any notable flaring that occurs. This will bring a slight chance of exceeding the S1 Minor Solar Radiation Storm level.

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Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	70	50	25	5
Strong	G3	No	25	10	5	1
Severe	G4	No	5	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	90	90	90	90
Very Active	R3 to R5 X	No	25	25	25	25

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	25	25	25	25
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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